

HST Observations of C/1996 O1 (Hale-Bopp)

H. A. Weaver, P. D. Feldman, J. B. McPhate (JHU), M. F. A'Hearn (UMD), C. Arpigny (Liège), J. C. Brandt, C. E. Randall (U. Colo.), S. A. Stern (SWRI/Boulder)

The activity of comet Hale-Bopp (C/1996 O1) is being systematically monitored using the Hubble Space Telescope (HST). Imaging observations with the Wide Field Planetary Camera 2 (WFPC2) began on 26 Sep 1995 when the comet had a heliocentric distance (r) of 6.60 AU, while spectroscopic observations with the Faint Object Spectrograph (FOS) began on 25 Oct 1995 at $r = 6.34$ AU. The spatial brightness profiles of the images have a pronounced cusp in the core indicating that reflection from the nucleus has been detected above the level contributed by the coma. Assuming that the geometric albedo is 4%, we estimate that the effective diameter of the nucleus is ~ 40 km. Only continuum was detected during the Oct 1995 spectroscopic observations. Both OH and CS emissions were first detected during observations on 7 Apr 1996 at a heliocentric distance of 4.78 AU, from which we derive H_2O and CS production rates of 2.5×10^{28} and 3.5×10^{26} , respectively. Between April and late July 1996 the H_2O production rate increased by a factor of ~ 6 while the CS production rate remained roughly constant. Three bands in the CO Cameron system were marginally detected ($\sim 5\sigma$) during observations on 23 Jun 1996 ($r = 4.00$ AU) and 26 Jul 1996 ($r = 3.64$ AU). Assuming that the Cameron bands are produced solely by photodissociative excitation of CO_2 , and using the solar minimum rate constant for this process, we derive a CO_2 production rate of $\sim 5 \times 10^{28} \text{ mol s}^{-1}$ for both dates. The latter value is an upper limit on the CO_2 production rate if electron impact on CO also contributes significantly to the excitation of the Cameron bands. No emission was detected in the (0,1) band of the CO Fourth Positive Group near 1597 Å, but saturation effects are probably important in this case.

Abstract submitted for 1996 DPS meeting

Date submitted: LPI electronic form version 5/96

Division for Planetary Sciences Abstract Form

DPS Category 24

Running #7452

Session 0.00

Invited ☐ Poster presentation ☒ Title only ☐

Have you received your Ph.D. since the last DPS meeting?

Yes ☐ No ☒

Is your abstract newsworthy, and if so, would you be willing to prepare a news release and be available for interviews with reporters?

Yes ☐ No ☐ Maybe ☒

Paper presented by Harold A. Weaver

Dept. of Physics and Astronomy
Johns Hopkins University
3400 N. Charles Street
Baltimore MD 21218 USA
Phone: 410-516-4251
Fax: 410-516-5494
Email: weaver@pha.jhu.edu

Special instructions: Tue Aug 27 16:26:51 CDT 1996

Membership Status (First Author):

DPS-AAS Member ☒ Non-Member ☐

Student Member ☐ Student Non-Member ☐

Is this your first DPS presentation? Yes ☐ No ☒

Sponsor: